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(54) DVD AUDIO DISK, AND RECORDING AND REPRODUCING METHOD, ENCODE DEVICE AND DECODE DEVICE THEREFOR

(57)Abstract:

PROBLEM TO BE SOLVED: To allow a user to perform various reproduction of a DVD(digital video disk) audio disk and a disk manufacturing person to use the same disk in different manners.

SOLUTION: A DVD coding circuit 34 records onto a DVD audio disk one or more musical pieces, bonus information regarding the musical pieces, and interactive data for accessing the bonus information. A control section 63 on a reproduction side admits reproduction of the bonus information when correct interactive data is input. In addition, the DVD coding circuit 34 records onto the DVD audio disk a program for dividing one or more music programs into groups and reproducing each of the groups and interactive data for accessing each group of the musical pieces. The control section 63 on the reproduction side admits reproduction of the musical pieces included in the group for which an input interactive data coincides with the transmitted interactive data.
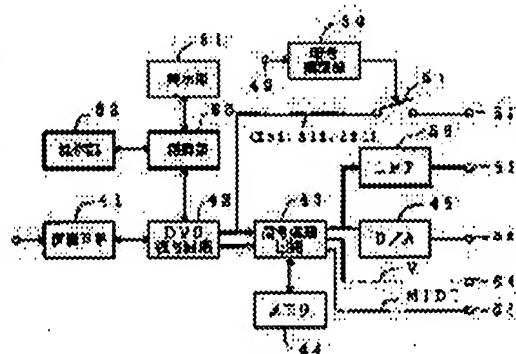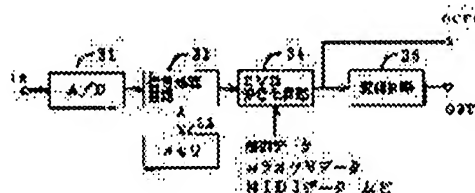
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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to decoding equipment at a DVD audio disk and its record
playback approach, and an encoding equipment list.
[0002]
[Description of the Prior Art] since DVD (digital videodisc) is large capacity compared with CD
(compact disk) -- a sound -- its attention is paid as every easy audio disk.
[0003]
[Problem(s) to be Solved by the Invention] By the way, high density record is more possible for DVD
than CD, and since allowances are in chart lasting time, let it be a technical problem how to use this as a
musical record medium. For example, besides a musical piece original as a music source, if alternatively
reproducible as the karaoke and BGM, how to enjoy oneself for a user will spread. Moreover, the usage
that how to enjoy oneself as a user performs playback actuation repeatedly spreads is desired.
[0004] This invention aims at providing with decoding equipment the DVD audio disk which can be
used by the approach a user can perform various playbacks and disk manufacturers differ the same disk
and its record playback approach, and an encoding equipment list in view of the above-mentioned
trouble.
[0005]
[Means for Solving the Problem] In order to attain the above-mentioned purpose, the interactive data for
accessing one or more musical pieces, the bonus information about a musical piece, and bonus
information are recorded on a DVD audio disk, this invention is a playback side, and when right
interactive data input, it permits playback of bonus information. For example, although data, such as
karaoke, BGM and MIDI, and practice voice at the time of sound recording, are recorded as bonus
information about an original musical piece and its musical piece and an original musical piece permits
playback for nothing, bonus information can consider a use gestalt to which playback is permitted, when
a user inputs the personal identification number which carried out learning of the payment of a
countervalue on conditions as interactive data. Moreover, although an original musical piece permits
playback unconditionally, bonus information sets quiz through an image means to a user, and when a
user inputs a correct answer as interactive data, it can consider a use gestalt to which playback is
permitted.
[0006] Namely, one or more musical pieces and bonus information about said musical piece, [according
to this invention] The step which transmits the interactive data for accessing said bonus information
through a DVD audio disk, While permitting the step which inputs the interactive data for accessing said
bonus information, and said transmitted playback of a musical piece regardless of said input interactive
data The record playback approach of a DVD audio disk of having the step which permits playback of
said bonus information when said input interactive data and said transmitted interactive data are in
agreement is offered.
[0007] Moreover, according to this invention, the encoding equipment of the DVD audio disk which has

an A/D-conversion means to carry out A/D conversion of the analog audio signal of one or more musical pieces, and to generate a digital data train, said digital data train, the bonus information about said musical piece, and a record means to record the interactive data for accessing said bonus information on a DVD audio disk is offered.

[0008] Moreover, according to this invention, the DVD audio disk which recorded the interactive data for accessing the digital data train which carried out A/D conversion of the analog audio signal of one or more musical pieces, and generated it, the bonus information about said musical piece, and said bonus information is offered.

[0009] Moreover, the digital data train which according to this invention carried out A/D conversion of the analog audio signal of one or more musical pieces, and generated it, It is decoding equipment of the DVD audio disk which decodes the DVD audio disk which recorded the interactive data for accessing the bonus information about said musical piece, and said bonus information. While reproducing an input means to input the interactive data for accessing said bonus information, and said musical piece, regardless of said input interactive data The decoding equipment of the DVD audio disk which has a playback means to reproduce said bonus information when said input interactive data and said transmitted interactive data are in agreement is offered.

[0010] In order to attain the above-mentioned purpose again, this invention records the program for carrying out the group division of the one or more musical pieces, and reproducing for every group, and the interactive data for accessing a musical piece for every group on a DVD audio disk, and permits playback of the musical piece of the group input interactive data and whose transmitted interactive data corresponded. For example, grouping is carried out to an original musical piece group, the musical piece group who changed the performance approach and how to sing, or a group division is carried out to an original musical piece group, and it records on each musical piece, such as karaoke, and BGM, MIDI, with him. And when a user inputs the group number which carried out learning gratuitously as interactive data, and the personal identification number for every group which carried out learning of the payment of a countervalue on conditions, a use gestalt to which the group's rebirth is permitted can be considered.

[0011] Namely, the program for according to this invention, carrying out the group division of one or more musical pieces and said musical piece, and reproducing for every group, The step which transmits the interactive data for accessing said musical piece for every group through a DVD audio disk, The step which inputs the interactive data for accessing said group's each, The record playback approach of a DVD audio disk of having the step which permits playback of the musical piece of the group said whose input interactive data and said transmitted interactive data corresponded is offered.

[0012] Moreover, according to this invention, the encoding equipment of the DVD audio disk which has an A/D-conversion means to carry out A/D conversion of the analog audio signal of one or more musical pieces, and to generate a digital data train, said digital data train, a program for carrying out the group division of said musical piece, and reproducing for every group, and a record means to record the interactive data for accessing said musical piece for every group on a DVD audio disk is offered.

[0013] Moreover, according to this invention, the DVD audio disk which recorded the digital data train which carried out A/D conversion of the analog audio signal of one or more musical pieces, and generated it, the program for carrying out the group division of said musical piece, and reproducing for every group, and the interactive data for accessing said musical piece for every group is offered.

[0014] Moreover, the digital data train which according to this invention carried out A/D conversion of the analog audio signal of one or more musical pieces, and generated it, The program for carrying out the group division of said musical piece, and reproducing for every group, An input means to be decoding equipment of the DVD audio disk which recorded the interactive data for accessing said musical piece for every group, and to input the interactive data for accessing said group's each, The decoding equipment of the DVD audio disk which has a playback means to reproduce the musical piece of the group said whose input interactive data and said transmitted interactive data corresponded is offered.

[0015]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with reference to a drawing. The block diagram showing 1 operation gestalt of the encoding equipment of the DVD audio disk which drawing 1 requires for this invention, The block diagram with which drawing 2 shows the digital disposal circuit of drawing 1 to a detail, the explanatory view in which drawing 3 shows the sampling period and A/D-conversion data stream of an A/D converter of drawing 1 , The explanatory view showing a format of the user data with which drawing 4 was processed by the digital disposal circuit of drawing 2 , The explanatory view showing a format of the audio pack with which drawing 5 is formatted by the DVD coding network of drawing 1 , and a video pack, The explanatory view showing the DVD-audio format into which drawing 6 is formatted by the DVD coding network of drawing 1 , The explanatory view in which drawing 7 shows the audio contents block unit (ACBU) of drawing 6 to a detail, The explanatory view in which drawing 8 shows the audio control (A-CONT) pack of drawing 7 to a detail, The explanatory view in which drawing 9 shows the audio search data (ASD) in the A-CONT pack of drawing 8 to a detail, The block diagram showing 1 operation gestalt of the decoding equipment of the DVD audio disk which drawing 10 requires for this invention, The block diagram with which drawing 11 shows the digital disposal circuit of drawing 10 to a detail, the explanatory view in which drawing 12 shows processing of the digital disposal circuit of drawing 11 , and drawing 13 are the flow charts for explaining regeneration of the control section of drawing 10 .

[0016] Next, the configuration of an encoder is explained to a detail with reference to drawing 1 . An analog audio signal is inputted into an input terminal IN. This input signal by A/D converter 31 A sufficiently high sampling frequency (sampling period deltat shown in drawing 3), For example, it is sampled by 192kHz, for example, is changed into the PCM signal of a 24-bit high resolution. It is changed into the data streams xb1 and x1 corresponding to Curve alpha, xa1, x2, xb2, x3, xa2, ..., xbi, x2 i-1, xai, x2i, and ... as shown in drawing 3 .

[0017] This data stream (xbi, x2 i-1, xai, x2i) is encoded by the digital disposal circuit 32 and memory 33 which are shown in detail, and, subsequently packing is carried out to drawing 2 by the DVD coding network 34 in a DVD audio format. This packing data is outputted to an output terminal OUT1, or a modulation circuit 35 becomes irregular by the modulation technique according to a medium, and it is outputted to an output terminal OUT2.

[0018] With reference to drawing 2 , the configuration of a digital disposal circuit 32 is explained in detail. first, the low pass filter 36 which passes one half of bands, for example, an FIR filter From the data stream (xbi, x2 i-1, xai, x2i) corresponding to the curve alpha shown in drawing 3 The data stream xc1 corresponding to the band-limited curve beta, *, *, *, xc2, *, *, *, xc3, *, *, *, ..., xci, *, *, *, and ... are obtained. Next, data streams xc1, xc2, xc3, ..., xci and ... are generated by thinning out data "*" among this data stream, and thinning out by the circuit 37. Here, the data stream xci is the data stream which the digital data in which A/D conversion was carried out by A/D converter 31 band-limited, and reduced the sampling frequency to one fourth. Moreover, inside of a data stream (xbi, x2 i-1, xai, x2i) and data xi Data streams xb1, xa1, xb2, and xa2, ..., xbi and xai, and ... are generated by thinning out and thinning out by the circuit 38.

[0019] and these data streams xci, xbi, and xai -- being based -- difference -- the adder 39 which acts as a calculator -- difference -- xbi-xci=delta 1 ixai-xci=delta 2i is calculated. here -- difference -- Data delta 1i and delta 2i may be less than [24 bits or it], and immobilization or adjustable are sufficient as the number of bits. the allocation circuit 40 -- a data stream xci and difference -- packing is carried out to the user data of a format as shows Data delta 1i and delta 2i to drawing 4 (one packet = 2034 bytes), and the user data is outputted to the DVD coding network 34.

[0020] To the user data this one packet of whose is 2034 bytes, as shown in drawing 5 , the DVD coding network 34 adds a total of 14 bytes of pack header of 4 bytes of pack start information, 6 bytes of SCR (System Clock Reference: system time-of-day criteria reference value) information, 3 bytes of Mux rate information, and 1 byte of stuffing, and constitutes an audio (A) pack (one pack = a total of 2048 bytes). Moreover, in the case of V pack, a video signal and data are arranged at a user data area.

[0021] In this case, the time amount of A pack in the same album is manageable by considering as "1" SCR information which is a time stump as continuation within the same album in the head pack in an

ACB unit. Moreover, the group division of the A pack can be carried out by assigning a number for every group as SCR information.

[0022] The DVD coding network 34 carries out packing of the recording information in a format as shown in drawing 6 (b) again, in order to record the karaoke information (a signal format is a music + image), the BGM signal (a signal format is the music), the MIDI code (a signal format is data), and quiz data (a signal format is data) other than the musical piece source of Maine on a DVD-audio disk. Drawing 6 (a) and (b) show each format of a DVD-video and DVD-audio, respectively, and although, as for a format of a DVD-audio, the names of area differ, they have DVD-video and compatibility. First, it divides roughly, a format of DVD-video is constituted by each area of a top video manager (VMG) and two or more video title sets (VTS) following it, and the format of another side and a DVD-audio is constituted by an audio manager (AMG) and each area of two or more audio album sets (AAS) following AMG corresponding to this.

[0023] Each of VTS is constituted by VTSI of a top VTS information (VTSI), one or more video contents block sets (VCBS) following it, and the last, and another side and each of AAS are constituted by AASI of a top AAS information (AASI), one or more audio contents block sets (ACBS) following it, and the last corresponding to this. The performance time amount of each music in ACBS is set to AASI in the real time.

[0024] Each of VCBS is constituted by two or more VCBs, and another side and each of ACBS are constituted by two or more ACBs. Each of VCB is 1 title of video and each of ACB is one album of an audio corresponding to this. each (1 title) of VCB is constituted by two or more chapters, and each (one album) of another side and ACB is constituted by two or more trucks corresponding to this. In a truck, a chapter contains a par TOOBU album (PTA) including a par TOOBU title (PTT).

[0025] Each of a chapter is constituted by two or more cels, and each of another side and a truck is constituted by two or more indexes corresponding to this. Each of a cel is constituted by two or more VCB units (VCBU), and each of another side and an index is constituted by two or more ACB units (ACBU) corresponding to this. Each of a VCB unit and an ACB unit is constituted by two or more packs, and one pack consists of 2048 bytes.

[0026] Each of a VCB unit A top control pack (henceforth, CONT pack), It is constituted by two or more video (V) packs following it, an audio (A) pack, and the subpicture (SP) pack. Each of another side and an ACB unit two or more A packs and need which follow a top audio control pack (henceforth, A-CONT pack) and it corresponding to this as shown in drawing 7 -- responding -- V pack -- it is further constituted by non-illustrated SP pack if needed.

[0027] The information which controls consecutive V pack in a CONT pack is arranged, and the information for managing the audio signal of consecutive A pack like the TOC information on CD in an A-CONT pack is arranged. Audio data, such as karaoke music and BGM, are arranged at the user data area of A pack as bonus information besides an original musical piece, or information for every group, and super titles other than audio data besides video datas, such as an image of karaoke, (for example, karaoke), the MIDI code, quiz data, etc. are arranged at the user data area of V pack.

[0028] The A-CONT pack is constituted by 14 bytes of pack header, 24 bytes of system header, 1003 bytes of ACD (audio character display) packet, and 1007 bytes of ASD (audio search data) packet as shown in drawing 8 . Moreover, the ACD packet is constituted by the computer program for carrying out the group division of the personal identification number/the musical piece for reproducing 6 bytes of packet header, 1 byte of substream ID, 636 bytes of ACD (audio character display) information, and bonus information, and reproducing, and 360 bytes of hold area. This hold area is used as a personal identification number / a computer program area. In addition, you may make it record a personal identification number and a computer program also on 360 bytes of hold area. The ASD packet is constituted by 1000 bytes of same ASD (audio search data) as shown in 6 bytes of packet header, and 1 byte of substream ID and drawing 9 in detail.

[0029] ASD (audio search data) is constituted by 16 bytes of general information, 8 bytes of the present number information, 16 bytes of current time information, 8 bytes of album set search information, 8 bytes of album search information, 404 bytes of truck search information, 408 bytes of index search

information, 80 bytes of highlights search information for searching bonus information, and 52 bytes of hold area as shown in drawing 9 .

[0030] When recording the bonus information over the Hara music signal recorded on A pack in such a format (for example, when arranging the karaoke information), while recording the music signal on A pack which adjoins A pack of the Hara music signal and is arranged, how to record the alphabetic data for karaoke on V pack which similarly adjoins and is arranged can be considered. Moreover, the BGM signal, practice voice at the time of sound recording, etc. are recorded on A pack which adjoins A pack of the Hara music signal and is arranged. Moreover, the MIDI code of the Hara music signal is recorded on V pack.

[0031] When reproducing such bonus information, although it is reproducible for free about the Hara music signal, the user who purchased the disk has to pay a countervalue proper about bonus information, and has to input a personal identification number. As other usage, a countervalue memorizes a quiz program as no charge, and displays this by the decoder side, and when a right answer is inputted, the use gestalt which reproduces bonus information is also considered. Moreover, in the case of the disk which recorded the playback program for carrying out the group division of the musical piece, and reproducing for every group on the A-CONT pack, a user pays a countervalue to each playback program, or inputs a personal identification number into it for nothing.

[0032] Next, a decoder is explained with reference to drawing 10 . First, according to the modulation technique of the modulation circuit 35 by the side of an encoder, it gets over by the demodulator circuit 41, and, subsequently to an A-CONT pack, A pack, V pack, etc., the signal read in the DVD audio disk is separated by the DVD decoder circuit 42. The user data in A pack (a data stream xci and difference data delta 1i and delta 2i) are impressed to the digital disposal circuit 43 (and memory 44) shown in drawing 11 in detail while they are impressed to the stream-I/O terminal 52 through a switch 51. Moreover, the video data in V pack is outputted to an external display through the video processor 48 and the video outlet terminal 64, and the MIDI code is outputted to external electrohone through MIDI processor 49a and the MIDI output terminal 65.

[0033] In a digital disposal circuit 43, as shown in drawing 11 , first, delta1 i+xci=xbidelta2 i+xci=xai calculates with an adder 46, and data streams xbi and xai are restored. Here, data streams xbi and xai are 24 bits of origin.

[0034] Subsequently, as the interpolation processing circuit 47 shows to drawing 12 using two or more data of data streams xbi and xai, it is the data stream xi in the meantime. It interpolates. In addition, it is the interpolation data stream xi by burying zero data to each and for example, making it pass a low pass filter in the interpolation processing circuit 47 using rise sampling. It can ask. Interpolation data stream xi You may make it ask by curvilinear approximation or prediction approximation again. In this case, order of approximation can be raised by adding an approximation auxiliary data and making it transmit.

[0035] Thus, the data by which interpolation processing was carried out are arranged like xb1, x1, xa1, x2, xb2 and x3, xa2, ..., xbi, x2 i-1, xai, x2i, and ..., and are impressed to LPF (low pass filter)56 with D/A converter 45 which this signal shows to drawing 10 .

[0036] In D/A converter 45, A/D conversion is carried out with the quantifying bit number of 24 bits by the encoder side, therefore it is encoded and is recorded on a record medium, and the data stream (xbi, x2 i-1, xai, x2i) processed by the digital disposal circuit 43 by the side of a decoder is changed into an analog audio signal with the sampling frequency which is 192kHz, and is outputted through an analog output terminal 55. Moreover, in LPF56, this input data is restricted to one fourth of bands (48kHz), and is outputted through an output terminal 53 as digital data.

[0037] With this operation gestalt, moreover, the bit stream (a data stream xci and difference data delta 1i and delta 2i) transmitted through the medium The terminal 49 for outputting a copy (sound recording) enabling signal, while an output is possible through a switch 51 and the bit stream output terminal 52 in the condition as it is and a personal identification number inputs, The decryption section 50 which turns ON a switch 51 based on the copyright data in the personal identification number inputted through this terminal 49 and subheader is formed. The decryption section 50 includes the authentication function to judge the bona fides of a personal identification number.

[0038] When the personal identification number was inputted, it is checked [of authentication] and it is attested with a Shinsei thing, the decryption section 50 checks the copy authorization conditions of the copyright data in subheader, for example, "conditions for payment", and, in O.K., permits the copy of a bit stream by turning ON a switch 51.

[0039] Moreover, a playback part is specified with the interactive input signal from the keyboard of a computer as a control unit 62, or a quiz program can be displayed on a display 61 and a right answer can be made to input through a control unit 62. In this case, the voice and the image for which it could output, without having band-limited or band-limiting, and was suitable from two or more scenes are chosen, it carries out SUTORI-ization (highlights-izing), and you may make it reproduce.

[0040] Next, regeneration of a control section 63 is explained with reference to drawing 13 . When a bonus computer program is chosen in step S1, it progresses to step S2, and in other cases, it progresses at step S5. At step S2, if waiting and a personal identification number input the input of a personal identification number, it will judge whether it is the right (step S3), it progresses to a right case at step S4, and in not being right, it progresses to step S5. In step S4, a bonus computer program is chosen and loaded (step S4), and, subsequently playback according to directions is performed (step S5).

[0041] Although the pack of bonus information may be intermingled with A pack of an original musical piece and may be arranged, you may make it record it on the specific truck of a disk instead here. In the example shown in drawing 14 , it is divided into 1st lead-in groove area 7a, 1st data area 7b, 1st lead-out area 7c, 2nd lead-in groove area 7d, 2nd data area 7e, and 2nd lead-out area 7f toward a periphery at a disk from the inner circumference of the direction D of a path, and 1st data area 7b and 2nd data area 7e are divided into the Maine data tracks and a bonus code track. In this case, like [when a proper personal identification number inputs, or when a correct answer is obtained with the question of the quiz of the built-in computer program], only when playback authorization conditions are suited, a bonus code track is accessed and it reproduces. Moreover, you may make it reproduce based on the highlights search information recorded on ASD shown in drawing 9 .

[0042] The software offered by this invention explained above is A. bonus information (bonus musical piece).

B. The programs of another application (karaoke playback program etc.)

C. It is a bonus program and the area where Programs B and C are recorded is program fields, such as a.A-CONT pack b. 1st data area 7b.

[0043] And when these are combined, there are ten kinds of approaches as follows.

(1) A+a (a program is one and reproduces the bonus information A by the correct answer of the charge or quiz)

(2) A+b (a program is one and reproduces the bonus information A by the correct answer of the charge or quiz)

(3) B+a (it is two or more, one is chosen, and a program is used as another disk software (karaoke software etc.))

(4) B+b (it is two or more, one is chosen, and a program is used as another disk software)

(5) A+B+a (a program is in an A-CONT pack, is two or more and is used as disk software with one [different from selection ****].) The bonus information A is reproduced by the correct answer of the charge or quiz.

(6) A+B+b (a program is in a program field, is two or more and is used as disk software with one [different from selection ****].) Moreover, the bonus information A is reproduced by the correct answer of the charge or quiz.

(7) C+a (although a program is one fundamentally, another program as a bonus is selectable and is used as another disk software.) Drawing 13)

(8) C+b (although a program is one fundamentally, another program as a bonus is selectable and is used as another disk software.) Drawing 13)

(9) A+C+a (although a program is in an A-CONT pack and it is one fundamentally, another program as a bonus is selectable and is used as another disk software.) Moreover, the bonus information A is reproduced by the correct answer of the charge or quiz.

(10) A+C+b (although a program is in a program field and it is one fundamentally, another program as a bonus is selectable and is used as another disk software.) Moreover, the bonus information A is reproduced by the correct answer of the charge or quiz. Drawing 14)

[0044]

[Effect of the Invention] One or more musical pieces and bonus information about a musical piece, [according to / as explained above / this invention] Since playback of bonus information was permitted when the interactive data for accessing bonus information were recorded on a DVD audio disk, it was a playback side and right interactive data were inputted For example, although data, such as karaoke, BGM and MIDI, and practice voice at the time of sound recording, are recorded as bonus information about an original musical piece and its musical piece and an original musical piece permits playback for nothing Bonus information can consider a use gestalt to which playback is permitted when a user inputs the personal identification number which carried out learning by payment of a countervalue as interactive data. Therefore, it can use by the approach a user can perform various playbacks and disk manufacturers differ the same disk. Moreover, the program for according to this invention, carrying out the group division of the one or more musical pieces, and reproducing for every group, The interactive data for accessing a musical piece for every group are recorded on a DVD audio disk. Since playback of the musical piece of the group input interactive data and whose transmitted interactive data corresponded was permitted For example, when grouping of the performance approach or how to sing is carried out to the musical piece group who changed and a user inputs the group number as an original musical piece group as interactive data, can consider a use gestalt to which the group's rebirth is permitted, and it follows. It can use by the approach a user can perform various playbacks and disk manufacturers differ the same disk.

[Translation done.]